

Fig. 14. Posterior view of the head showing main tracheæ entering the occipital foramen from thorax, also the tracheal system of labium and maxillæ.

Fig. 15. Tracheæ found in the metathoracic leg.

Fig. 16. Dorsal aspect of the digestive canal showing on left side the alimentary tracheæ and on the right side the abdominal air sacs.

NEW SPECIES OF *SERICA* (SCARABÆIDÆ).—I.

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Two years ago, while determining the Scarabæidæ contained in the collection of the Department of Entomology, University of Nebraska, the writer became interested in the genus *Serica*. It was at once apparent that the material at hand could not be named from the existing literature relating to this genus. In some cases the species were obviously new, in others several species seemed to answer equally well to the very brief and general descriptions, and it was impossible to tell which were new and which were not. Further than this, the writer was unable by external characters alone to satisfactorily divide the series before him into definitely marked species, regardless of names. However, some very surprising and encouraging discoveries were made by examining the genitalia of several species. As a result of these studies the task of working out a monographic revision of the genus was undertaken. Up to the present time between two and three thousand specimens, coming from many parts of the United States and Canada, have been studied.

Special acknowledgment should be made to Messrs. Leng, Blatchley, Casey and Skinner for permitting me to examine and dissect valuable type material, and to Mr. Gilbert Arrow for comparing specimens for me with the American types in the British Museum. In fact it is only through this generous assistance that any real progress has been made in applying the published names.

The large amount of time necessary for making the almost countless dissections and numerous drawings required for this work, compels the writer to return much borrowed material, and publish the descriptions of a number of new species before the study can be

completed. It is hoped, however, that the descriptions and figures of the new species will stimulate an interest in this long neglected genus and ultimately result in a far more complete review than would otherwise have been possible.

All types, unless otherwise noted, are deposited in the collection of the Department of Entomology, University of Nebraska.

Serica campestris new species.

♂. Length, 8.5 mm., width, 4.5 mm. Color very dark mahogany, upper surface bare, polished and shining, without any trace of sericeous or pruinose lusters; however, the propygidium, basal margins of pygidium, sixth sternite and sides of the preceding sternites, anterior coxæ and lower half of anterior femora lightly pruinose.

Clypeus slightly, or not at all depressed below the level of the front, lateral margins moderately elevated, the anterior margin more suddenly and strongly elevated, moderately sinuate at the middle; the lateral incisure acute and only moderately strong; discal area very slightly tumid just below the middle; evenly and closely punctured, the punctures separated by one half to two thirds their own diameters. Clypeal suture fine but distinct. Front and occipital area less densely and regularly punctured, the punctures contiguous to separated by three times their own diameters. Antennal club about equal to the total length of the antenna beyond the basal constriction of the first segment. Eyes not large, and head relatively broad and short, as is shown by the following measurements:¹ Diameter of head through eyes 23, distance between inner eye margins, 14; length of head on medial line, 16; extreme width of clypeus in front of incisure, 11.5; antennal club, 7.7; dorso-ventral diameter of eye, 8.2.

Pronotum convex, widest through the posterior angles which are bluntly rectangular, and arcuately narrowed to the acute anterior angles; puncturation similar to that of front, but becoming somewhat closer toward the sides. The pronotal measurements are as follows: Width through posterior angles, 37; width through anterior angles, 23.5; length on median line, 21. Scutellum closely punctured like pronotum, but often a little less densely so on the median line; though apparently longer than wide, the actual measurements are: Base, 15; length, 15.

Elytra normally furrowed, the grooves very closely punctured with three rather confused rows of laterally coalescing punctures; costæ with a few irregularly placed punctures. Length of elytra, 70; greatest width, 45-50. Body beneath coarsely, not closely punctured, the punctures finer on the abdomen, where they tend to develop into longitudinal wrinkles. Middle of fifth abdom-

¹ The unit of measurement used is one tenth of a millimeter; measurements obtained by the translation of micrometer readings. (Use only actual measurements, because the impressions of comparative dimensions are usually inaccurate, often astonishingly so.)

inal sternite more or less longitudinally excavated. All of the abdominal sternites with a single, submarginal row of inconspicuous setæ. Median impressed line of metasternum with a closely approximated, and posteriorly slightly diverging line of small confluent punctures on each side, laterad of these lines a row of setigerous punctures.

The genital armature of the male (Pl. VI) measures 2.7 mm. in length and shows a more than common degree of asymmetry, which often extends down the stalk to the base of the dorsal prominence. No variations of consequence have been noted in the armatures of the numerous specimens examined. The genital plates of the females of all of the species seem to be very simple and undifferentiated, and are therefore not figured at the present time.

♀. Differs from the male only in the usual secondary sexual characters: slightly shorter antennal club, more convex underline of abdomen, less convex pygidium and much less emarginate sixth ventral plate.

Type: ♂. Lincoln, Nebraska, May 6, 1918 (L. Bruner).

Allotypes: ♀. Lincoln, Nebraska, June 5, 1918 (L. Bruner).

Paratypes: 51 ♂, 37 ♀:

Nebraska: Lincoln 35 ♂, 18 ♀; Fairmont 1 ♂, 1 ♀; Hooper 1 ♂; Brock 1 ♂.

Iowa: Iowa City 1 ♂.

Illinois: Nashville 1 ♂, 1 ♀.

Indiana: Lafayette 9 ♂, 17 ♀; Marin Co. 1 ♂.

Louisiana: Vowell's Mill 1 ♂.

This species is very similar in general appearance to *S. intermixta* Blatchley, in fact is separable only by very careful comparison of specimens, unless the determinations are made by examining the male genitalia which differ widely in the two species, the claspers of the armature being nearly symmetrical in *intermixta*. The principal differential, external characters of *campestris* are its darker color, distinctly less heavily punctured elytra and shorter antennal club, than in *intermixta*.

Serica cucullata new species.

♂. Length, 10 mm.; width, 5.5 mm. Color chestnut-brown, upper surface bare, polished and shining, without any trace of sericeous or pruinose lustres; the only trace of a pruinose luster observable on the entire body being on the anterior coxæ, inferior portion of anterior femora and terminal segment of the abdomen.

Clypeus distinctly impressed, with elevated margins, the anterior margin more strongly so, slightly reflexed and moderately sinuate at the middle; the lateral incisure relatively deep, wide and obtuse at the bottom; discal area very distinctly tumid slightly below the middle; puncturation moderately

strong, uniform and rather dense, the punctures separated by one half to two thirds of their own diameters. Front much less densely punctured; the punctures irregularly placed, contiguous to separated by three or four times their own diameters. Occipital area nearly impunctate. Antennal club rather long, about equal to the total length of the antenna. The eyes are relatively large, and the head narrow anteriorly, as is shown by the following measurements: Diameter of head through eyes, 28; distance between inner eye margins, 16; length of head on median line, 20.5; extreme width of clypeus in front of incisure, 13; antennal club, 11.3; dorso-ventral diameter of eye, 11.

Pronotum transverse and only moderately convex; sides but little convergent through the posterior two thirds of their length, then rather suddenly rounded inwardly to the anterior angles; puncturation similar to that of the front, becoming somewhat closer toward the sides. The pronotal measurements are as follows: Width through the posterior angles, 44; width through the anterior angles, 29; length on median line, 24.5. Scutellum closely punctured at the sides, nearly impunctate through the center and at the apex; though apparently longer than wide, the actual measurements are: Base, 11; length, 12.

Elytra strongly furrowed, the sulci densely and coarsely punctured, with the punctures arranged in three irregular rows which show a tendency to become laterally confluent. Elytral costæ well rounded and with a few large scattered punctures. Length of elytra, 81; greatest width, 55-60. Body beneath coarsely, not closely punctured, the punctures finer on the abdomen. Fourth sternite often more or less impressed at the middle, sometimes showing a fine, longitudinal line through the vaguely defined impression. The single, submarginal rows of setæ seen on the sternites of most of the species are here nearly or quite wanting, although rows of slightly coarser punctures are traceable. Metasternum similar to that of the preceding species.

The genital armature of this species is unusually large, measuring 3.4 mm. in length. Its general characteristics are sufficiently indicated by the figures on Plate VII, but attention should be drawn to the nature and extent of the variations observed. The sides of the stalk are often much less convergent toward the tip than is shown in the figure, in a few examples nearly parallel, also the recurved rims of the claspers are often much less angulate, in fact the angulation nearly or quite disappears in a few specimens. A single specimen is at hand from Clayton, Georgia, with the stalk much shortened.

♀. Differs from the male only in the usual secondary characters mentioned in the preceding description.

Type: ♂. Montreal, Quebec, May 6, 1905 (A. F. Winn).

Allotype: ♀. Black Mountains, North Carolina, August 26, 1912 (Wm. Beutenmüller).

Paratypes: 29 ♂, 2 ♀:

Canada: Montreal, Quebec 1 ♂; Ottawa, Ontario 1 ♂; St. Therese Island, Quebec 1 ♂; Winnipeg, Manitoba 1 ♂;

Aweme, Manitoba 1 ♂; Kentville, Nova Scotia 1 ♂; British Columbia 1 ♀.

Wisconsin: Trout Lake 1 ♂.

Michigan: Lake Superior 1 ♂.

Maine: Paris 1 ♂.

New Hampshire: Three Mile Island 1 ♂.

New York: Ithaca 6 ♂, 2 ♀; McLean Bogs, Thompkins Co. 2 ♂; Saranac Lake 1 ♂; Lynds 1 ♂.

Connecticut: Cornwall 1 ♂; Colebrook 1 ♂.

Washington, D. C.: 1 ♂.

North Carolina: 1 ♂; Black Mountains 3 ♂.

Georgia: Clayton 1 ♂.

This species is easily distinguished from the preceding by its larger size, paler color, more strongly furrowed elytra and much stronger clypeal notch. However, its separation from some of the other related species is a matter of some difficulty unless the genital armature is examined.

Serica elusa new species.

♂. Length, 10 mm.; width, 5.5 mm. Color chestnut-brown; upper surface bare, polished and shining; the only trace of a pruinose luster observable on the entire body being on the anterior coxæ, inferior portion of anterior femora, sixth sternite and margins of pygidium.

Clypeus but very slightly impressed, with elevated margins, the anterior more strongly so, very slightly reflexed, and moderately sinuate at the middle; the lateral incisure acute, varying in depth from one-half to the entire width of the elevated margin; discal area very distinctly tumid at the middle of the lower half; puncturation rather strong, finer and denser on the tumidity, coarser and sparser above it, with the punctures rarely attaining the clypeal suture; the narrow, irregular, impunctate area thus formed rather emphasizing the already well defined suture. Clypeus and sides of front with a few stiff, erect, golden-brown hairs. Front a little less densely and regularly punctured than the upper portion of the clypeus, the punctures contiguous to separated by three times their own diameters. Occipital area nearly impunctate. Antennal club rather long, about equalling the total length of the antenna. Eyes moderate in size. Measurements of head as follows: Diameter of head through eyes, 26.5; distance between inner eye margins, 16; length of head on median line, 18; extreme width of clypeus in front of incisure, 12; antennal club, 10.5. Dorsal-ventral diameter of eye, 10.

Pronotum nearly twice as wide as long, moderately convex, sides but little convergent through the posterior three-fifths of their length, then broadly rounded to the anterior angles; rather coarsely punctured, more

sparsely so on the disk where the punctures are separated by one to three or four times their own diameters, and more closely so toward the sides where the average distance between the punctures about equals their own diameters; an oblique, shallow impression before the basal angles. The pronotal measurements are as follows: Width through the posterior angles, 43; width through the anterior angles, 28; length on the median line, 22. Scutellum coarsely punctured, the punctures crowded to the sides, leaving the median line and apex impunctate; length, 10; width, 10.

Elytra strongly furrowed, almost exactly as in *S. cucullata*, with the usual coarse, dense puncturation of the sulci, the punctures showing a tendency to coalesce laterally and to be arranged in three to four confused rows in each sulcus; costae rounded, bearing only an occasional puncture. Length of elytra, 74; greatest width, 55.

Posterior coxal plates coarsely and closely punctured; remainder of ventral surface with punctures finer and somewhat less densely placed. Fourth sternite often more or less impressed at the middle, sometimes showing a fine longitudinal line through the vaguely defined impression. Sternites without the usual rows of semi-erect setae. Median impressed line of metasternum with a closely approximated and posteriorly slightly divergent line of small, confluent punctures on each side, laterad of these lines a row of setigerous punctures.

Length of genital armature of male, 3 mm. (Pl. VIII); armature with an unusually heavy stalk in proportion to the diminutive claspers.

♀. Antennal club measuring 8 instead of 10.5, as in the male; under line of abdomen evenly convex; and sixth sternite less emarginate at the middle of its apical margin than in the male.

Type: ♂. Ithaca, New York, April 14, 1915.

Allotype: ♀. Ithaca, New York, May 5, 1915.

Paratypes: 5 ♂.

New York, Ithaca 2 ♂.

New Hampshire, Three Mile Island 3 ♂.

Elusa differs from *S. cucullata* by having the clypeus somewhat more polished, and distinctly more sparsely punctured especially along the suture; by the less depressed discal area with the tumidity more limited behind and its crest more anterior in position, and the clypeal incisure less pronounced and distinctly more acute at the bottom. The pronotum of *elusa* is slightly more convex, with the sides less parallel behind and less suddenly and strongly convergent in front. Altogether the resemblances of the two species are so remarkable, and the differences so much more like individual variation than specific characters, that one would ordinarily refuse to accept *elusa* as a valid species

were it not for the striking and indisputable evidence furnished by the structure of the genital armatures of the males of the two species.

Serica ochrosoma new species.

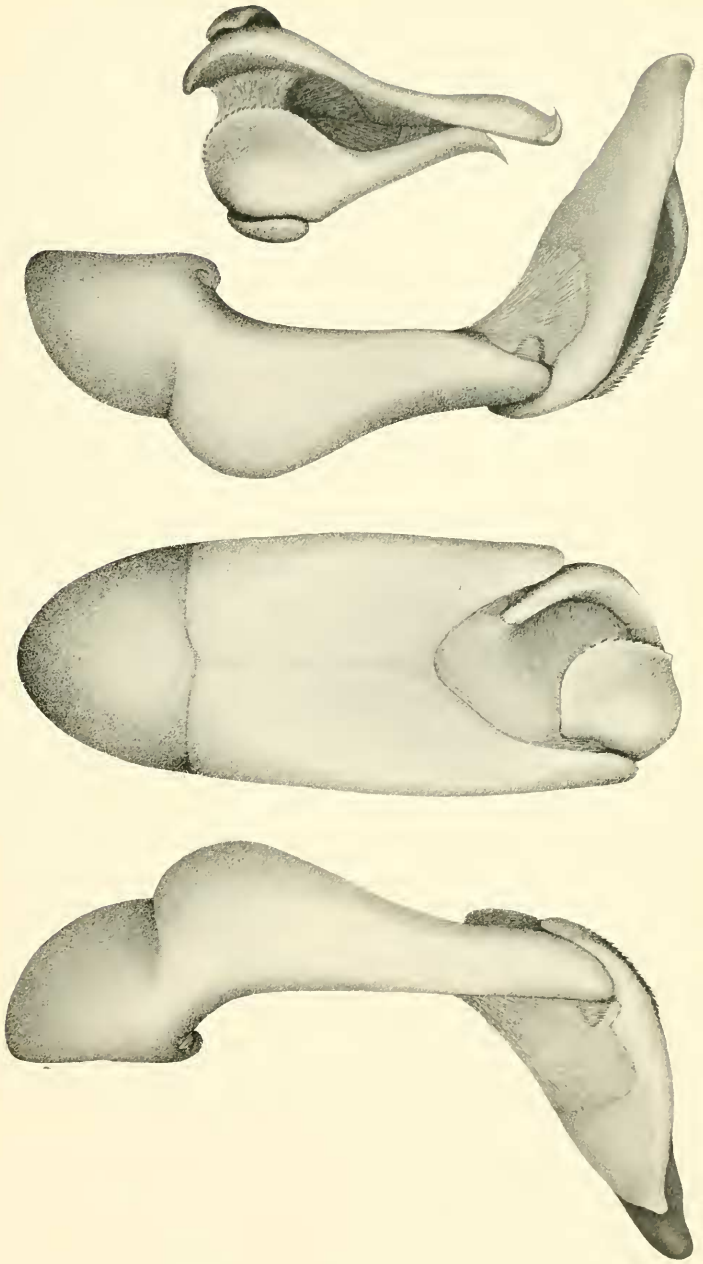
♂. Length, 7.5 mm.; width, 3.75 mm. Color dull yellowish brown, much resembling that of *Cyclocephala immaculata*; upper surface bare, polished and shining; beneath shining, except for a slight pruinose lustre on anterior coxae and lower portion of anterior femora and a slight opacity of the abdominal sternites; especially the last one.

Clypeus neither depressed nor elevated, but exactly continuous with the smooth, even convexity of the front; anterior margin suddenly and rather strongly reflexed; reflexed tip, viewed from in front, strongly and evenly arcuate; lateral margins of clypeus elevated to about half the extent of the anterior elevation; lateral incisure deep, obtuse and conspicuous, entirely dividing the elevated margin; punctures moderately fine, except for a few coarse ones just before the anterior reflexed margin, closely and evenly placed, separated by about their own diameters, or a little less, and interspersed with a microscopic, secondary puncturation; clypeal suture very fine, and inconspicuous, though easily traceable. Front with the same double puncturation as the clypeus, but the coarser punctures separated by one to three times their own diameters. Antennal club rather long, about equaling the total length of the antenna. Eyes rather large. Measurements of head as follows: Diameter of head through eyes, 20; distance between inner eye margins, 12.3; length of head on median line, 15; extreme width of clypeus in front of incisure, 9; antennal club, 8; dorso-ventral diameter of eye, 7.6.

Pronotum one and two-thirds times as wide as long, rather strongly convex, sides but little convergent through the posterior two-thirds of their length, then sloping more abruptly to the anterior angles, very uniformly and rather closely punctate; posterior angles of pronotum often showing traces of an oblique impression, and in front of this, about three-fifths of the way to the anterior margin of the pronotum, a slightly impressed spot showing a persistent tendency to be clouded with dark brown. The pronotal measurements are as follows: Width through the posterior angles, 30; width through the anterior angles, 20; length on the median line, 19. Scutellum less shining than the pronotum and elytra, with the punctures crowded to the sides; length, 8; width, 8.

Elytra rather strongly striated, the striae clearly defined or line-like, and the interspaces of uniform width and quite evenly convex; punctures fine and discrete, rather evenly distributed and showing but little if any tendency to be arranged in lines; surface of elytra with a barely discernible sericeous luster and microscopic secondary puncturation. Length of elytra, 55; greatest width, 38.

Metasternum and posterior coxal plates, especially the latter, shining, coarsely and closely punctate and microscopically alutaceous. Second, third,



Serica campestris Dawson.